Watershed Database and Mapping Projects
# Calcasieu Estuary (Louisiana)

Protection and restoration of coastal watersheds requires the synthesis of complex environmental issues. Contaminated site remediation, dredging and disposal of contaminated sediments, and restoring injured habitats are a few of the challenges facing coastal managers. The evaluation of multiple environmental issues can be significantly improved by combining scientific data and watershed characteristics into a Geographic Information System (GIS). NOAA's Coastal Protection and Restoration Division (CPRD) has developed the Watershed Database and Mapping Projects (Watershed Projects, for short) to combine the use of a standard database structure, database-mapping application (Query Manager™) and GIS. Sediment contaminant and toxicity and tissue data, natural resources, and potential habitat restoration projects can be overlaid on a watershed's features and land uses, and displayed on maps at flexible spatial scales. This approach simplifies data analysis and presentation, provides valuable tools for complex decision-making, and improves our understanding of dynamic aquatic ecosystems.

NOAA has used this approach in several watersheds affected by contaminant releases from Superfund sites and several other sources including Charles River, Hudson River, Newark Bay, Christina River, Anacostia River, Sheboygan River, St. Andrew Bay, Calcasieu Estuary, San Francisco Bay, and Puget Sound. These Watershed Projects use a standard structure along with information tailored to the major objectives of each watershed. For example, the Newark Bay Watershed Project supports decisions about remediation and disposal of contaminated sediment, while the San Francisco Bay Watershed Project focuses on Superfund site remediation and habitat restoration. The common organizational structure for data and spatial information promotes data sharing among Federal, state, and local agencies working within a watershed.

NOAA's approach is to provide a rapid, convenient way to create maps of the watershed that display analyzed, sorted, and summarized data that coastal managers have selected from a menu of programmed queries. The primary data types stored in the Watershed Projects include sediment chemistry, sediment toxicity, and tissue chemistry data. The
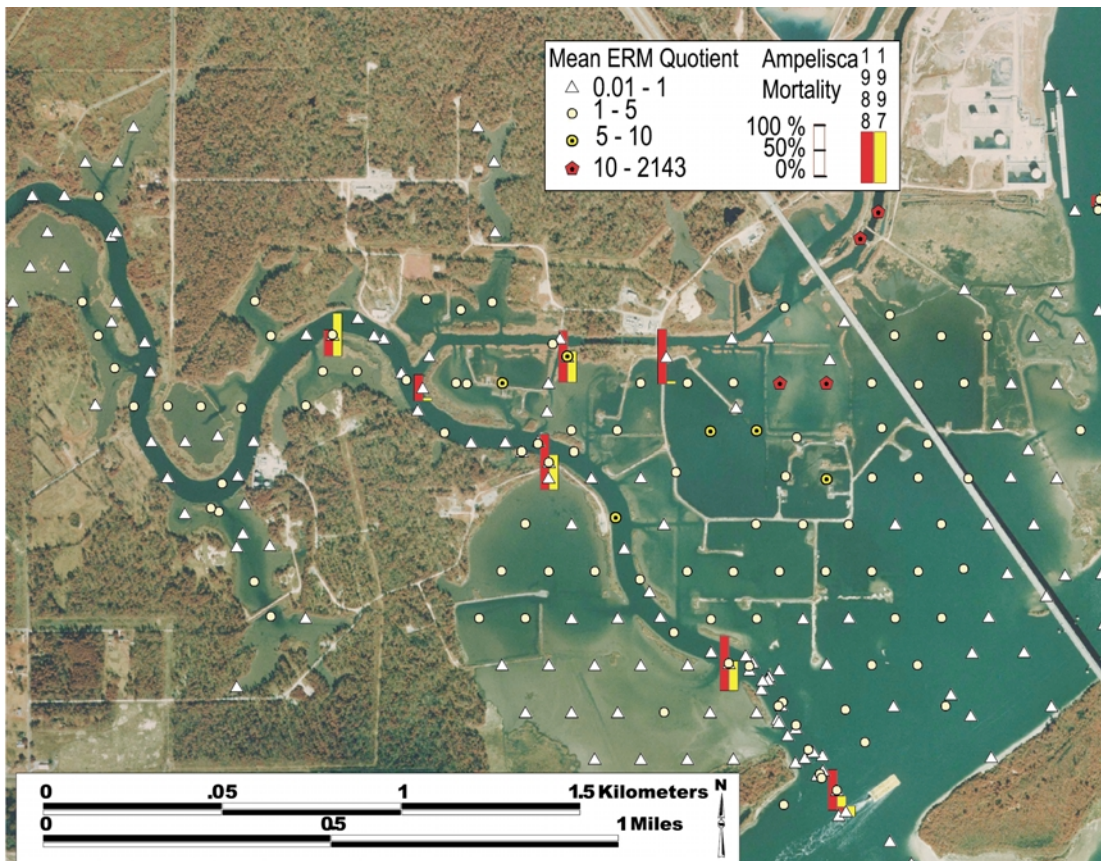
The Calcasieu Estuary Watershed project helps demonstrate the spatial component of ecological risk to coastal resource managers and communities. This figure compares the number of ERM values exceeded during 1997 and 1998 with observed sediment toxicity in Bayou D'Inde.

base maps also display geomorphology, habitat characteristics, and land-use information. Integrating remedial investigation data with recent data in a single system helps investigators associate the distribution of contaminants with specific sources and evaluate the possibility of contaminant effects in potential habitat restoration areas. Combining restoration information and contaminant distributions across the watershed enhances the potential for successful restoration of wide-ranging populations.

The Calcasieu Estuary in southwest Louisiana is a highly productive estuarine habitat that supports fisheries for shrimp, oysters, catfish, blue crabs, redfish, and menhaden. Industrialization of the upper portion of the Calcasieu Estuary began in the 1940s with oil refineries and petrochemical industries predominating in 10 miles of the 37-mile long estuary. Because of this history and accidental spills, the upper Calcasieu Estuary is contaminated with hazardous substances from Moss Lake in the south to the saltwater barrier north of Lake Charles. Portions of Bayous d'Inde, Olsen, and Verdine are severely contaminated, resulting in advisories against fish and shellfish consumption and swimming/water sports.

The Calcasieu project uses ArcView® to show the geographic distribution of contaminant and toxicity test data from several EPA Superfund site investigations, RCRA offsite facility investigations, and other studies. Base maps depict habitat classification, land use, bathymetry, industrial site locations, and other information. Recently, EPA completed phase 1 of a synoptic sediment contaminant sampling plan with cooperative PRPs (e.g., Conoco and Olin) that combined the CPR project with EPA's Fully Integrated Environmental Location Decision System (FIELDS) tool for developing sampling designs. These data have been incorporated into the project and were used to determine that approximately 85% of the Calcasieu system requires no further investigation. Additional sampling data will be included in future iterations of the project to determine biological impacts.

Users can rapidly compare historical information in the database to the synoptic data set to evaluate temporal trends in sediment contamination. Layers of information available through ArcView also will be used to select and evaluate potential restoration sites needed for development of a natural resources compensation plan for the estuary. Mapping and spatial analysis will be used to illustrate and communicate concerns to the public and the various agencies involved in the cleanup regarding contaminant threats, potential impacts of cleanup actions, and the restoration needs in the estuary.

Analytical tools such as database queries and import/export scripts developed for one project can be applied to all projects because of the common database and GIS project structure. Query Manager can be used to select and export data to any program that supports standard spreadsheet, database, or tab-delimited text files. Scripts have been developed for seamless import of data from Query Manager to ArcView GIS to enhance and simplify further data analysis and presentation.

The Watershed Projects run on standard desktop Macintosh® and Microsoft Windows®-based personal computers. The database and mapping application, Query Manager, is an easy-to-use, interactive system that allows you to query the database and rapidly display the results on a map in MARPLOT® or deliver the data in the appropriate form to an ArcView GIS project. In addition, both standard and customized basemaps are developed in ArcView to support all Watershed Projects. Standard layers include wetlands, Superfund sites, and regulated industrial facilities and NOAA digital navigation charts. Custom imagery and other spatial data layers also are routinely used with data from the Query Manager database.

CPRD's Watershed Projects are proving useful throughout the Superfund remedial decision-making process, from identifying locations for the collection of additional samples to providing the historical context for interpreting data, to identifying areas for restoration. This versatile tool improves NOAA's ability to protect and restore the biodiversity of watersheds that contribute to healthy coastal habitats.

For additional information, call Alyce Fritz at 206/526-6938, Ron Gouguet at 214/665-22312 or visit our website at **http:// response.restoration.noaa.gov/cpr/cpr.html**